I. Project Title: General Hydrology Support

II. Principal Investigator:
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III. Project Summary:

The Service's Division of Water Resources provides basic hydrology support to Recovery Program researchers and undertakes tasks to support the Recovery Program in basic data collection and monitoring projects. Accomplishments during FY 2001 include; 1) collecting temperature data at ten sites on the Green River and four sites on the Colorado River, and assembling a temperature database for use by Program researchers; 2) coordinating contracting for Yampa River sediment monitoring; 3) providing technical hydrology support for a wide range of Recovery Implementation Program activities on a year-to-year basis; and 4) coordinating other Recovery Program efforts relating to hydrology and temperature analysis.

IV. Study Schedule: Initial Year - 1990, Final Year - Ongoing.

V. Relationship to RIPRAP: Colorado and Green River Action Plans I.
Provide and protect instream flows.

VI. Accomplishments of FY 2001 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

A. Temperature Data Collection

Temperature data collection during FY-2001 went well, no thermographs were stolen and very little data were lost from thermographs being out of the water at the lowest flow conditions since 1994 and 2000. The thermographs at Ouray refuge had problems in 2000 because the river is wide and gets very shallow during periods of low flows. To overcome this problem in 2001 additional thermographs were placed at several other locations which have a low flow channel that is accessible for the river bank.

A great deal of time was spent in FY 2001 providing data to John Carron of Hydrosphere. Work included retrieving data reformatting data and transmitting data. Time was also spent reviewing the "Gunnison River/ Aspinall Unit Temperature study- Phase I" (See Study Executive Summary on Riverdata web site).

The organizing the temperature data collected since 1990 continued in 2001 along with preparing the 2001 for archiving and publishing on the web. The yearly process includes downloading data in the field in March, July, and October, graphically plotting the data and visually checking the data and preparing presentation quality graphs using Excel spreadsheets. The spreadsheets are then web enabled and linked to the Riverdata Web Page. The temperature data can be accessed and downloaded from the riverdata web page at http://www.r6.fws.gov/riverdata/ or by email request from FWS Division of Water Resources (address above). A photo was included on the web page to display the general location of each thermograph. GPS locations for each thermograph is available by request, for security purposes the exact locations are not provided on the web page.

A new temperature monitoring project got underway in 2001 to monitor real time water temperatures at Echo Park above and below the confluences of the Yampa and Green Rivers. After investigation of cost associated with purchasing equipment to monitor and transmit data out of Echo Park it was determined that the budget for the project was only sufficient to purchase equipment for 1 real time monitoring station and four stations were needed. This development was brought to the attention of the Flaming Gorge work team and Recovery Program staff and a decision was made to scale back the project and try to accomplish the same objective by adding real time temperature monitoring to the Deerlodge Park USGS gage and to add a USGS temperature gage at the Gates of Lodore. The equipment for the gages was purchased by Wyoming using funding which usually is earmarked for the Division of Water Resources out of Wyoming annual contribution to the Recovery Program. The Equipment was ordered in September, permits were obtained from Dinosaur National monument and plans are to install the equipment in the spring before runoff.

The Grand Junction CRFP office currently maintain thermograph at six locations on the Colorado River and one on the Gunnison River. One site, at Palisade, was inactive for six years (1993-1998); was reactivated in 1999. Two other sites were added in 1999: one just upstream of the confluence with the Green River and one on the Gunnison River at RM 35, about midway between Whitewater and Delta. At all stations two thermograph are deployed at separate but relatively nearby locations so that backup data will be available if one should be lost or stolen. Older Ryan thermograph have been phasing out and have been replaced by the newer, cheaper, Onset Tidbit devices. The Grand Junction CRFP in 2001 retired their last still-operating Ryan thermograph. In addition to these sites, Bob Burdick of our office has recently added two more sites on the upper Colorado to aid in interpreting movements of pikeminnow translocated in that part of the river. The new locations are near Rifle and near Una on the Colorado River. Over the years some problems have been experienced problems getting complete annual data sets at some sites due to mishaps and a variety of hazards associated with placing equipment in a river environment. For instance, no data was acquired at the Confluence site in 1999 because, as it turned out, the tidbits were not properly activated. At Goldbar, between Moab and Potash, both units became buried in sediment and could not be retrieved in 2001. In this instance, the site was moved

downstream and two new tidbits were deployed.

Thermograph data is downloaded either annually or biannually, unfortunately the Grand Junction CRFP has have fallen behind on converting the raw two-hour interval data into daily means. In 2001, I made an effort to become caught up with this. Substantial progress was maid in getting caught up in 2001 but, there is still have a ways to go. Plans are to finish this task in 2002. Jim Renne provided the Grand Junction CRFP office with a great program that he devised to rapidly make the daily mean calculations from the tidbit data. Additional work will be needed to get caught up with old Ryan thermograph data. When all the data is reformatted and checked the data will be made ready for inclusion on the River data web page.

B. Hydrology Support for Biological Opinions:

The Division of Water Resources monitored endangered fish releases from Flaming Gorge, Ruedi, and the Aspinall Unit during the spring runoff and post runoff period. The interest of the Recovery Program was represented at the quarterly operational meetings, and input was provided on flow patterns and protection of water for endangered fish. The Division of Water Resources also provided support to researchers working on flow recommendations and related reports. Specific work accomplished is addressed under the appropriate work task below.

Gunnison River:

The Division of Water Resources continued to provide support in developing data for the synthesis, and worked with Chuck McAda in resolving issues identified in the minority report.

Colorado River Programmatic Biological Opinion:

Worked with Recovery Program staff to set up procedures and accounting methods for tracking depletions under the Colorado River Programmatic Opinion.

C. Hydrology Support for Development of Flow Recommendations:

With the withdrawal of the instream filings for the Colorado and Yampa Rivers, very little work was required in relation to the development and support of flow recommendations:

Yampa River Operation and Management Plan:

The Division of Water Resources provided assistance to the Program Director's Office by coordinating meetings, developing scopes of work for gaging, hydrology model review, and developing annual project reports. The Division of Water Resources also supported the Yampa Plan by reviewing documents and attending Hydrology work group meetings.

VII. Recommendations:

The work provided is, for the most part, in support of other research projects or activities such as flow delivery, flow quantification, and habitat restoration, all of which have a direct impact on the recovery of the Colorado River endangered fish. The direct quantification of the success of many of the activities is difficult because most of the activities are long-term in nature.

VIII. Project Status: Ongoing and on-track.

IX. FY 2001 Budget Status:

A. Funds provided:	$ 64,500
B. Funds expended:	$ 64,500
C. Difference:	$ 0

X. Status of Data Submission: Not applicable.

XI. Signed: *George Smith* December 10, 2001
Principal Investigator Date:

APPENDIX: Reports, the temperature data collection, and database for water year 20001will be placed on the Recovery Program's Home Page for access by researchers by December 31, 2001.